

engaged in the industry were comparable to American wages and living standards. The practical difficulties of dictating standards to another country, and more basic than that, of determining what are comparable standards, seemed to other observers to invalidate this approach.

Many of those present thought the solution lay in expanded markets. These would depend in large part on improved quality. How to achieve this improvement was also the subject of debate. The general consensus appeared to be that quality improvements could only be achieved through standards established by the industry itself and maintained by inspection by a government agency, preferably the Fish and Wildlife Service.

Trends in Exploratory Fishing and Technological Research

LAWRENCE W. STRASBURGER

Endvoldsen Shrimp Inc., New Orleans, La.

In the discussion of the paper by Louis S. Mowbray, it was brought out that the Larson trawl in its present form may be utilized only by two boats. Because of its size, it cannot be handled by a single boat, but it may be used as a bottom trawl. The government of Bermuda plans to continue studies on fishery problems, even though the current studies discussed failed to disclose the presence of fish, since gill nets were set with the wind and in the wrong tide. There is no demand for natural vitamin A from a shark fishery since synthetic vitamin A is very cheap and recent experiments show that there is no difference between the synthetic and natural products. There may however be a market in the future for shark meat as there is now in Bermuda where it is considered a delicacy when fried or boiled and heavily seasoned. It has been used in other countries when sold as "swordfish" and canned as "grayfish." Both yellow-fin and black-fin tuna occur to some extent in Bermuda waters. There does not seem to be too good a possibility of there being sufficient raw material to support a fishery. They do not enter the local fisheries, and are only taken while trolling. There is a greater prevalence of yellow-fin tuna when the waters are at 70° F. Apparently their range is between 57 and 84° F. Black-fin tuna are present all year. In the summer months when the water temperature is approximately 80° F. the yellow-fin tuna are deep and the black-fin tuna are on the surface. While large amounts of bait-fish are present, there have been no appearances of menhaden-like fishes reported. There is a thermal layer in the water surrounding Bermuda where plankton seem to concentrate and while shrimp may have been present there are no pelagic fish.

Following the paper by C. B. Carlson, it was learned that, although TV gear was not utilized as had been hoped, television has a practical application, i.e. to note stress and strains on the nets and the way in which the nets are working rather than to view the shrimp actually entering the nets. The camera has a range of 200 feet in very clear water, but may not be used in turbid water. Experiments with a mud rope showed no handling difficulties at 35 fathoms, but at greater depths such as 250 to 300 fathoms, the mud rope was difficult to handle and it was necessary to substitute a chain breaker line.

According to Mr. Stewart Springer: The Gulf tuna boats are mainly using harengula for bait, Ground chum and other dead fish have been tried, but

live shrimp have not. Long line fishing was attempted consisting of a long floating main line, with smaller lines with hooks running off therefrom. Black-fin and white skipjack schools were found to be mixed. The black-fin were seen more readily. The weather cycles in the Gulf are good in summer, bad in winter, the hurricane season in the fall, although the southern Caribbean is free from hurricanes. Some months are better than others; tuna boats cannot afford to return to shore because of weather.

Virgil E. Harris, in the discussion, stated that Professor McMillan in electrical fishing, in 1928 used frequencies higher than 60 cycles; his experiments were made with frequencies up to 500,000 cycles. Effective range does not seem to allow for practical fishing since distances are only about ten meters. It is probable that differing current densities will be necessary in order to induce electrotaxis in different species of fish. Rough fish were cleared from inland waters in Germany, in fresh water; therefore heavy amounts of current were needed. A new adaptation of electrical fishing has been use of a double-hook line which forms an electrical field to stun the fish. This has primarily been used for tuna and a company has produced approximately thirty sets of the gear. By utilization of this gear the fish is stunned so that it lies dormant and may be handled with greater ease.

Higman & Idyll stated that the objectionable odor noted in shrimp held in sea water, after approximately eighteen days, was a strong shrimpy odor, earthy and musty. There was no odor of hydrogen sulfide and both heads-off and heads-on shrimp exhibited identical odors. The experimental work was done in an attempt to produce an easy and cheap method for refrigerating shrimp where fishermen cannot afford to purchase freezer boats or install freezers on their present boats. Temperature is the key to success in holding in sea water, and although experiments showed that shrimp were of an acceptable quality when held for 24 days, the authors do not recommend that they be held for such a period of time. There is no apparent softening of a shrimp when held in sea water brine at temperatures from 29 to 32° F. There is, however, a very definite protein loss by leaching; and the refrigerated sea water tends to toughen the shrimp when compared to shrimp held in ice. The authors feel that while they have always recommended quick freezing as the best method of preserving shrimp, where it is impractical or impossible to utilize such a method, holding in refrigerated sea water is far superior to utilizing the conventional icing methods on shrimp. So far as is known no experiments have been conducted on the freezing of shrimp after holding in refrigerated sea water.

The major portion of the discussion on the paper by Earle L. Divers was on glazing of shrimp. It was brought out that utilization of a brine glaze causes the shrimp to be too salty and also the salt seems to concentrate in spots on shrimp, which breaks the glaze and the shrimp subsequently become black-spotted, not in any given area as true melanosis but in minute spots approximating the size of a pinhead all over the shell. Spray glazing is difficult and is the poorest method of any in use, since it does not coat all of the shrimp in the package. The author has found shrimp which were rancid to taste, although it was brought out that shrimp contained an exceedingly low percentage of fat. It is felt that the occurrence of rancidity in shrimp is exceedingly rare. Packaging of shrimp in large cans may be possible although it was felt that the utilization of such package material might after a considerable length

of time produce a somewhat dehydrated product. Observations after several months of shrimp frozen in cans, showed no dehydration. The author did not feel that utilization of deicing machines would alter prices to the consumer.

The Emphasis in Oyster Research in Past Years

J. G. MACKIN

Texas A. & M. College, College Station, Texas

Eight papers were presented to the morning session of the shellfisheries session of the Institute. This meeting was guided by Chairman William W. Anderson of the Fish and Wildlife Service. Summaries of the papers by the authors (with two exceptions) were presented in the abstracts section. Discussion was deferred until the afternoon panel session, when the papers were examined in considerable detail. It should be noted that there were two substitutions for authors in presentations of the morning session. First, Mr. George Gehres presented the paper by Richard P. Hardison which discussed bacteriological standards for oysters under conditions of a semi-tropical climate. Second, Chairman Anderson presented the paper by Phillip A. Butler which contained data on the importance of local environment in control of growth in oysters. Otherwise all papers were presented by the authors.

In the absence of A. E. Hopkins of the Gulf Research Laboratory of Mississippi, Dr. Paul Galtsoff consented to serve on the afternoon discussion panel. With Mr. J. N. McConnell of Louisiana and the authors of the various papers completing the panel.

Papers were discussed in the order in which they were read, with the exception of the first. Mr. Gehres was detained but since the contents of Mr. Hardison's paper is of very considerable importance to the oyster industry some remarks concerning certain portions of it may not be amiss.

The paper did not attempt to present research data, but raised certain questions concerning the applicability of bacteriological standards developed for a more northern climate, to the semi-tropical Caribbean and Gulf coasts. Among other points made it was suggested that studies be made on several phases of the problem. These were (1) effect of temperature on the death rate of coliforms, (2) the effect of salinity on death rates under subtropical conditions, (3) determine whether or not development of coliforms takes place in oysters, and (4) studies to determine whether or not obsolete methods are being used. It is clear that such studies must be of primary importance, due to the fact that health agencies are bound by law to close to oystering those areas not meeting standards as now set up. If, as suggested, the standards themselves do not fit the climate, or have become obsolete, the oyster industry may be taking unnecessary penalties under the closure laws.

Philip A. Butler, Director of the Pensacola, Florida Station described in his paper, which was presented by William H. Anderson, difference in mortality and growth in oysters placed on opposite sides of the island on which the Pensacola Station stands. These stations were substantially equal as regards such factors as salinity, temperature, depth, turbidity, etc. Growth of local oysters at the two stations was substantially different, and the difference was